ALGEBRA

C — 9

83. If X= $2-\sqrt{3}$,then $x-\frac{1}{x}$ is :

(A) $3\sqrt{3}$ (B) $-2\sqrt{3}$
(C) $5\sqrt{3}$ (D) $12-30\sqrt{3}$

RRB NTPC 2022

$$x = 2-\sqrt{3}$$

$$\Rightarrow \frac{1}{x} = \frac{1}{2-\sqrt{3}}$$

$$= \frac{1(2+\sqrt{3})}{(2-\sqrt{3})(2+\sqrt{3})}$$

$$= \frac{2+\sqrt{3}}{(2)^2-(\sqrt{3})^2}$$

$$= \frac{2+\sqrt{3}}{4-3} = 2+\sqrt{3}$$

83. If $X = 2-\sqrt{3}$, then $x - \frac{1}{x}$ is :

(A) $3\sqrt{3}$
(B) $-2\sqrt{3}$
(C) $5\sqrt{3}$
(D) $12 - 30\sqrt{3}$

RRB NTPC 2022

$$x = 2-\sqrt{3}$$

$$\frac{1}{x} = 2+\sqrt{3}$$

$$x - \frac{1}{x}$$

$$= (2-\sqrt{3}) - (2+\sqrt{3})$$

$$= 2 - \sqrt{3} - 2 - \sqrt{3}$$

$$= -2\sqrt{3}$$

84. If $X=2-\sqrt{3}$, then $x+\frac{1}{x}=?$

(A) 4 ✓
(B) $3\sqrt{3}$
(C) $-2\sqrt{3}$
(D) $5\sqrt{3}$

RRB NTPC 2022

$x=2-\sqrt{3}$

$\frac{1}{x}=2+\sqrt{3}$

$x+\frac{1}{x}=4$ (A)

$x+\frac{1}{x}=2\times \text{Big}$
$=2\times 2$
$=4$ (A)

$x-\frac{1}{x}=2\times S$
$=2\times(-\sqrt{3})$
$=-2\sqrt{3}$

85. If $X = \sqrt{3} + \sqrt{2}$, then the value of $X^2 + \frac{1}{x^2}$ is:

(A) $2\sqrt{3}$
(B) 14
(C) 12
(D) 10

RRB NTPC 2021

$x = \sqrt{3} + \sqrt{2}$

$\frac{1}{x} = \sqrt{3} - \sqrt{2}$

$\Rightarrow x + \frac{1}{x} = 2 \times \sqrt{3}$

$= 2\sqrt{3}$

$\therefore x^2 + \frac{1}{x^2} = (2\sqrt{3})^2 - 2$

$= 12 - 2 = 10$ A

85. If $X = \sqrt{3} + \sqrt{2}$, then the value of $X^2 - \frac{1}{x^2}$ is:

(A) $2\sqrt{3}$ $4\sqrt{6}$ (B) 14
(C) 12 (D) 10

RRB NTPC 2021

$\left(x + \frac{1}{x}\right)\left(x - \frac{1}{x}\right)$

$= (2 \times \sqrt{3})(2 \times \sqrt{2})$

$= 4\sqrt{6}$ ✓

86. If $P = 5 - 2\sqrt{6}$, then fined the value of $p^2 + \frac{1}{p^2}$

(A) $\sqrt{6} - \sqrt{5}$
(B) 100
(C) $25 + \sqrt{6}$
(D) 98

RRB NTPC 2021

$$P = 5 - 2\sqrt{6}$$

$$\frac{1}{P} = 5 + 2\sqrt{6}$$

$$P + \frac{1}{P} = 2 \times 5 = 10$$

$$P^2 + \frac{1}{P^2} = (10)^2 - 2 = 98$$

87. If $X = 3 + 2\sqrt{2}$, $X > 0$, then the value of $\sqrt{X} - \frac{1}{\sqrt{X}}$ is :

(A) 1 (B) $\sqrt{2}$

(C) 2 (D) $2\sqrt{2}$

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88. If $X = 7 - 4\sqrt{3}$, then the value of $(X^2 + \frac{1}{X^2})$ is :

(A) 195 (B) 197

(C) 196 (D) 194

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$$x + \frac{1}{x} = 2 \times 7 = 14$$

$$x^2 + \frac{1}{x^2} = (14)^2 - 2 = 194$$

89. If $X = 2 + \sqrt{5}$, then the value of $X^3 - X^{-3}$ is:

(A) −52 (B) 52

(C) 76 (D) -76

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$x - \frac{1}{x} = 2 \times 2$

$= 4$

$x^3 - \frac{1}{x^3} = (4)^3 + 3(4)$

$= 64 + 12$

$= 76$

$x^3 - \frac{1}{x^3}$

90. If $X = \frac{\sqrt{5}-2}{\sqrt{5}+2}$, then the value of $X^2 + X^2$ is:

(A) 350

(B) 345

(C) 284

(D) 322

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$$\frac{1}{x} = \frac{\sqrt{5}+2}{\sqrt{5}-2} \quad / \quad x = \frac{\sqrt{5}-2}{\sqrt{5}+2}$$

$$x + \frac{1}{x} = \frac{a-b}{a+b} + \frac{a+b}{a-b}$$

$$= \frac{(a-b)^2 + (a+b)^2}{(a+b)(a-b)}$$

$$= \frac{2(a^2+b^2)}{a^2-b^2}$$

$$x^2 + \frac{1}{x^2}$$

90. If $X = \frac{\sqrt{5}-2}{\sqrt{5}+2}$, then the value of $X^2 + X^{-2}$ is:

(A) 350
(B) 345
(C) 284
(D) 322

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$a=\sqrt{5}$ / $b=2$

$\frac{1}{x} = \frac{\sqrt{5}+2}{\sqrt{5}-2}$ / $x = \frac{\sqrt{5}-2}{\sqrt{5}+2}$

$x + \frac{1}{x} = \frac{2(a^2+b^2)}{a^2-b^2}$

$= \frac{2(5+4)}{5-4} = 18$

$x^2 + \frac{1}{x^2}$

$= (18)^2 - 2$

⊛ $(a+b)^2 + (a-b)^2 = 2(a^2+b^2)$

⊛ $(a+b)^2 - (a-b)^2 = 4ab$

91. If $p = \frac{\sqrt{2}+1}{\sqrt{2}-1}$, and $q = \frac{\sqrt{2}-2}{\sqrt{2}+2}$ then find the value of $\frac{p^2}{q}+\frac{q^2}{p}$:

(A) 200 (B) 196

(C) 198 (D) 188

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$q = \frac{1}{p}$

$$\frac{p^2}{q}+\frac{q^2}{p} = \frac{p^3+q^3}{pq} = \frac{p^3+\frac{1}{p^3}}{1}$$

$$\Rightarrow p^3+\frac{1}{p^3}$$

$$\Rightarrow (6)^3 - 3(6)$$

$$= 216 - 18$$

$$= 198 \text{ A}$$

$$p+\frac{1}{p} = \frac{2(a^2+b^2)}{a^2-b^2}$$

$$= \frac{2(2+1)}{1} = 6$$

92. If $X = \frac{\sqrt{5}-\sqrt{4}}{\sqrt{5}+\sqrt{4}}$, and $Y=\frac{\sqrt{5}+\sqrt{4}}{\sqrt{5}-\sqrt{4}}$,then the value of $\frac{X^2-XY+Y^2}{X^2+XY+Y^2}$?

H.W

(A) $\frac{361}{363}$

(B) $\frac{341}{343}$

(C) $\frac{384}{387}$

(D) $\frac{321}{323}$

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93 If $x = 2+\sqrt{3}$, then the value of $x^3 + x^{-3}$ is :

(A) 52 (B) −52
(C) $-52\sqrt{3}$ (D) $52\sqrt{3}$

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$x + \frac{1}{x} = 2 \times 2$

$= 4$

$x^3 + \frac{1}{x^3} = (4)^3 - 3(4)$

$= 64 - 12$

$= 52$ A

$x^3 + \frac{1}{x^3}$

94. If a = $\sqrt{8}$ - $\sqrt{7}$, and a = $\frac{1}{b}$,

then $\frac{a^2+b^2-3ab}{a^2+ab+b^2}$ is equal to:

(A) $\frac{27}{31}$ (B) $\frac{27}{32}$

(C) $\frac{29}{33}$ (D) $\frac{29}{31}$

SSC CHSL 2019